

SOME SPECIES OF LAMELLARIIDAE (Class Gastropoda) FROM THE EASTERN AUSTRALIAN COAST

By JOYCE ALLAN.*

(Plates 10-12)

In presenting this paper I have purposely refrained from specifically identifying the species, but have confined myself to producing the illustrations coupled to a somewhat full description which should make them recognisable if encountered at any time. My reason for doing this was that some years ago it was my intention to revise the family Lamellariidae, and I prepared intensive descriptions and illustrations of living specimens when they were brought to me. These, however, appeared very rarely, and years went by without further material being collected by myself or friends. The outbreak of World War II, with its depletion of staff and the application to duties of more immediate concern necessitated the dropping of this revision temporarily. The post-war period was even more difficult with lack of staff and rebuilding of the Molluscan room in the Museum and other reasons, so that it only now that I have been able to do further work on this proposed revision. By publishing the species, unnamed specifically, except initially A, B, C, D, they may be of more use to an author who may be revising the group, more so than if I had suggested new names for one or two of them, only to have them possibly found to be no synonymous with other species, for it is my belief at this stage that they should be considered in relationship to species from beyond Australia just as closely as from various localities in Australia.

From New South Wales we have *Marseniopsis inominatus* Iredale 1936, type locality, Sydney Harbour, which Iredale named for Hedley's *M. sp. Lamellaria indica* Angas 1867—Hedley's Check-list No. 705, but this does not agree with the four species under discussion. *M. australis* Basedow 1905, is recorded from S. Australia; *Lamellaria ophione* Gray, 1849 (1850) is the only record for Victoria, Tasmania and Queensland. This species is also recorded from Auckland (Type), and S. Australia. Their revision needs critical study of literature and material, even for the genus *Lamellaria* Montagu into which I am placing them, perhaps tentatively, as they appear to have the characteristics of that genus more than others of the family.

The specimens did not stand up to continuous handling, and in the case of one was only semi-alive when first found and already decomposing while being described and illustrated, but nevertheless, the descriptions and illustrations were faithfully done on the living animal.

Superfamily LAMELLARIACEA

Family LAMELLARIIDAE

Genus *Lamellaria* Montagu 1815.

Soft animals somewhat pleurobranch-shaped, carrying a small, thin, whitish and shiny shell internally on the dorsal surface. Surface of animal may be gelatinous, more so in some species than in others, usually pustulose and often with light coloured retractile filaments, at times branched, scattered over it. Foot is usually shorter than mantle, although in some circumstances can extend beyond it posteriorly. Head and foot well formed. The genus

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is mainly known by the few small shells which are only occasionally washed ashore, the animal rarely, if ever seen. The animals are thought to be carnivorous, sexes separate. Type of genus *L. perspicua* Linne.

The animals vary from less than an inch to about two inches or slightly more in size; their shells from below, to approximately an inch, or a little more.

Lamellaria sp. A.

(Plate 10, figures 1-16)

Animal large, almost as broad as long, in some positions quite circular. Very active, gelatinous, especially the undersurface. Mantle has pustulose appearance with fine veining, and two humps on central dorsum with rows of retractile, often branching filaments radiating from them. Some pustulose formation on anterior opening of mantle which turns back. Shell is wholly internal, swollen, white, of shelly texture, with distinct radiating lines. It rests over the viscera, occupying the whole of the central dorsal surface.

On the undersurface, between the mantle and the foot, extends anteriorly the head with conspicuous long eye-bearing tentacles; the eyes are black, situated about 4 mm. from where the tentacles arise from each side of the head. Tentacles and eyes are wide apart and the head neck is fairly long. Mouth is a transverse slit, but a proboscis is exerted when the specimen is placed in spirit, showing a portion of red-brown jaw. The animal was a male and the penis was situated about 7 mm. from the base of right tentacle, non-retractile but curls into branchial cavity when quiescent; flattened, and broad terminally. Two gills are seen on the roof of the cavity; they can protrude somewhat through the branchial opening on the right side below the head.

The foot is about half as broad as animal, with a long, broadened tail, and anteriorly has a double furrow. On the upper anterior portion of the foot, on either side of the head neck, a lower lamina is formed into a rounded flap, and an upper lamina forms two similar but shorter overlying flaps. These do not protrude beyond the foot at all, but seem to lie on it (see Pl. 10, f. 15) attached by a small muscular portion to the foot furrow ends beneath them.

Internally the jaw has a horny, yellow-brown portion like a fish scale, with fine and strong transverse lines; the jaw is a uniform mass with no indication of rods or serrations that I could see. The radula is ribbon-like, part straight, part curled; pale horny. There are 24 rows of teeth, three teeth in a row 1.1.1., consisting of a medium tooth conspicuously toothed laterally, overlapped on either side by a strong lateral tooth.

Colour of the living animal is somewhat similar to that of the sea-hare *Dolabrifera brazieri*, a greenish-brown base, brown speckling between, and with large yellow-orange blotches scattered over the surface. The two humps, also on the dorsal surface are orange red, and the filaments are yellow. Tentacles are yellow speckled, gill creamy, orange-red tipped. Undersurface is creamy yellow with orange tinted edges and white speckling. The foot is pinkish yellow with white splashing and edges with orange tones and orange-brown spots anteriorly. In spirit the animal became grey with the pustules showing at intervals.

Measurements of animal. Animal was 3 inches long and approximately the same width. Shell measured 27 mm x 14 mm. Radula, 15 mm., one-third curled. Jaws, 3 mm x 2.5 mm.

Locality: Gunnamatta Bay, Port Hacking, south of Sydney, N.S.W.
Collected M. Ward, January, 1941. Single specimen.

Remarks: When alive, this animal is extremely active, swimming by mantle movement, moving freely and turning over by curling over its foot-anterior to posterior; it also clings by its foot and swings around on an axis until the creature looks like a mushroom on a stalk, but very active indeed, and an extremely attractive marine animal (see Allan, J., *Australian Shells*, 1950, p. 138, fig. 1).

Lamellaria sp. B.

(Plate 11, figures 1-14)

Animal small, almost circular, of humped appearance which did not alter to any extent in preservative. Dorsal surface pustulose almost to warty appearance in spirit, which also made the animal seem solid and tough, rather more so than the living animal. The filaments characteristic of the former species did not show on this species. There was a square cut opening at the anterior end of the mantle, the base of this forms a siphon. Beyond this opening could be seen the long, linear tentacles protruding. The tentacles are interesting. Situated between the foot and mantle as usual, with the eyes half-way along their outer edge, an important difference lies between the position of the eyes in the species from Gunnamatta Bay (previous species), which are well below the base of the tentacles, which in themselves are wide apart and in almost straight line, whereas the Long Reef tentacles form a V at their base, with the eyes half-way down on projecting prominences on their outer edges.

The undersurface has a deep cut furrow leading to the branchial opening, through which the gills (two) protrude: they appear more free and much stronger than in the previous species. They are attached at one side to a cavity, and one of them is attached to the roof of the branchial cavity. The penis is flattened, broad, and of more uniform shape than with the former species. Strong lines cross from inner to outer edge, like corrugations. It protruded from a tenninus but did not appear retractile. The foot has a very striking appearance. It is about one-third the width of the animal, broad anteriorly, pointed posteriorly, somewhat leaf-shaped. The foot-sole has a slightly pustulose appearance, which may be due to wrinkling. The anterior end prolongs into two short ears, deeply furrowed, the furrows running down into the ear tips. Upper and lower laminae of anterior end of foot united at each end wing, forming simple furrow. Jaw has fine transverse lines and under very high power fine radiating lines noticed here and there; edges thickened. Radula is ribbon-like, longer than that in the previous species. Twenty rows of teeth are free, the remainder are curled or weak, and formula of teeth I.I.I. Teeth are very strong, larger and stronger than those of previous species, neither were there any serrations on the teeth, whereas in the other species, the teeth serrations stood out conspicuously and the teeth themselves were delicate and smaller.

Colour, reddish-orange, which changed in preservative to creamy pink, with scattered black dots and splashes. Undersurface, foot, tentacles and penis light coloured; gills cream. Jaw light olive green; radula dark horn.

Shell, more globose and shelly than the previous one, and rounded. Horn coloured on upper part of the columella; fine radiating growth lines

with faint suggestion of fine transverse lines. The shell was heavier than the former, with a more elevated spire.

Measurements: Complete animal, 42 mm. in length (and possibly in breadth), 23 mm. in height. Shell: 22 mm. by 17 mm., spire 7 mm. across. Penis was 11 mm. long and 4 mm. wide. Jaw: 4 mm. long, 2 mm. wide. Radula: 15 mm. long, made up of 6 mm. action piece, 6 mm. free straight portion, the remainder was coiled, the radula being 1-2 mm. wide.

Locality: Long Reef, north of Sydney, N.S.W. Collected by M. Ward, 1940, at dead low water.

Remarks: During the very short time this was alive, before it was placed in preservative, it did not display the gymnastic actions of the former species. This species could prove later to belong to a different genus than the previous species. Their differences have a subgeneric ranking, at least, if not generic.

I have seen this species from Bottle and Glass, Sydney Harbour, and one very like it, if not it, from 20-30 fms. off Brush Island, South Coast of N.S.W.

Lamellaria sp. C.

(Plate 12, figures 1-10)

Animal elevated especially in the central dorsum; crawls by pulling itself along in jerks, and when resting looks very like a nudibranch. It did not at any time show tendency to swim, or elevate the mantle as some species do. Foot sometimes extends beyond the mantle posteriorly; it clings by flattening the anterior portion of the foot sole and head to a rock and raising the hind portion of its body right up. Foot curls narrowly when handled. The mantle opens at the anterior end, showing a siphonal groove. The latter is not deep cut as in the previous species, but shallow and wide. The mantle opening referred to above is more V-shaped than squarish. The head tentacles are long and narrow and extend well beyond the mantle anteriorly when crawling. The general texture of the body is inclined to be rather firm and tough, the dorsal surface covered with filamentous pustules, and in the dorsal centre, the most elevated part of the animal, there are a few larger humps forming a more or less ridge. The foot is much narrower than the mantle. The upper end of the foot sole has a gland which acts as a pedal gland and is used to assist its jerky locomotion. Anteriorly, the foot is deeply grooved and at the sides slightly winged. Eyes are below the base of tentacles, on the outer edge.

A female specimen only was collected. Its genital opening was located at lower edge of branchial cavity. There were two dark gills in cavity, one of which seemed double, and the larger single one appeared more free. The mouth showed a delicate, pale, glassy jaw at its entrance, which when examined showed longitudinal lines and fine cross lines. The radula was the usual type, with 18-24 rows of pale teeth, dentition formula I.I.I. meeting to a point in centre, the lateral on either side more or less hiding the median tooth. Shell white, somewhat calcareous, somewhat like the Gunnamatta Bay one. Size, 11 mm. by 13 mm. The illustration in Plate 12 shows its features well.

Colour of the animal is dark greenish grey, with black speckling and spots. The filaments on the dorsal pustules are yellow, making the pustules appear yellow. Foot pale yellow spotted and speckled with darker colour. Undersurface of the mantle is light greyish, with darker grey mottlings, with small subdued black marks in them. Scattered filaments very faintly show through. Head and tentacles bases are speckled dark grey. Jaws are pale horn colour; radula has pale yellow teeth; the ovary is yellow, and the gills very dark, as stated above. In spirit, the general tone became greyish green with darker spots and speckling. The disappearance of most of the yellow colour was due possibly to the shrinkage down of the yellow filaments which are exerted in the living animal. The surface pustules appear small and pointed.

Measurements: Animal, when crawling, $1\frac{1}{2}$ inches long, $\frac{3}{4}$ inch wide. Shell, as stated above, is 11 mm. by 13 mm.

Locality: Angourie Pool, Clarence River, N.S.W. Found under big rock in deep water. Collected by A. A. Cameron and J. Allan, 6/6/1941.

Lamellaria sp. D.

(Plate 12, figures 11-20)

Animal small, rounded, mantle extended almost twice as far beyond tail tip as it does beyond head; mantle edges very thin, anterior opening in it appears almost like a crenulation, groove shallow. Surface is slightly pustulose. Undersurface shows a squarish head with slight but linear tentacles and eyes well apart at base of tentacles. The lower edge of the anterior foot groove extends beyond sides of foot in short flaps. Gills were not protruding beyond cavity. Jaws are horny and typical. Radula glassy, whitish, 19 rows in use, remainder coiled (slightly longer portion straight, detrition formula I.I.I. typical in shape, with faint suggestion of serration on each tooth.

Shell shiny, whitish, calcareous over yellowish spire apex, elongate, spire small but elevated, longitudinal and somewhat wavy lines, with a few spaced transverse ones, especially towards the suture of the body whorl. Both male and female specimens were collected and examined. The specimen from Woody Head was a male and slightly smaller than the female from Angourie Pool. The male shell was small and a perfect little shape, with small spire, and, although most of the calcareous element was patchy, yet the shell remained glassy, firm and opalescent. Female shell was naturally slightly bigger.

The penis of the male specimen was not protruding; it was tucked into the branchial cavity and formed an arched shield, as it were.

Colour: General colour of specimens was light salmon pink with tendency to orange. Specimens seemed immature, and colour of the smaller tended to cream with orange tints and speckled with orange-brown; orange spots appear on dorsal surface, and round the mantle undersurface. Gills were cream, and tentacles cream speckled with orange.

Measurements: Male animal (Woody Head) was only $\frac{1}{2}$ inch long, shell 6 mm. x 4 mm. x 4 mm.; the Angourie specimen, a female, was one inch long, with a corresponding larger shell, 10 mm. x 7 mm. x 9 mm. Tentacles were 3 mm. long and jaw 2 mm. x 2 mm.

Locality: Woody Head (male) and Angourie Pool (female), Clarence River, N.S.W. Collected at low tide, clinging to rock, by A. A. Cameron and J. Allan, June-July, 1941.

Remarks: A female specimen was also collected on sponge at Kirra Beach, Coolangatta, Queensland, and also another male, $\frac{3}{4}$ inch long. None of the specimens preserved well, and they became very shrunken and colourless, but the rather lengthy descriptions and the illustrations should identify specimens of their kind when found. It is quite possible all the specimens were partly undeveloped, but it is not expected their length would exceed very much more than that of the female mentioned earlier.

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EXPLANATION OF PLATES.

Plate 10.

- Fig. 1. Dorsal view of *Lamellaria* sp. A from Gunnamatta Bay.
 Fig. 2. Dorsal view with mantle cut to expose internal shell in situ.
 Fig. 3. Anterior portion of undersurface to show mantle with siphonal groove, head with tentacles, mouth, grooved foot and penis protruding at left of neck.
 Figs. 4, 5, 6. Three views of gymnastic manœuvres of animal witnessed before being preserved. Note the free swinging of mantle in relation to foot.
 Fig. 7. Jaw of species A.
 Figs. 8, 9. Two views of shell after removal from dorsal surface of animal.
 Fig. 10. Radula of same species. A number of rows, each composed of three teeth. (Much magnified.)
 Fig. 11. A single row of radula teeth consisting of a median tooth flanked on either side by a single lateral tooth.
 Fig. 12. Two lateral teeth.
 Fig. 13. Median tooth from radula.
 Fig. 14. Penis.
 Fig. 15. Anterior part of mantle turned back to display head with eye-bearing tentacles, (a) foot flaps, (b) branchial cavity, (c) penis, and (d) siphonal groove.
 Fig. 16. Anterior mantle cut and turned back to show (a) mouth with jaw within, (b) bulbus pharyngeus, and (c) radula.

Plate 11.

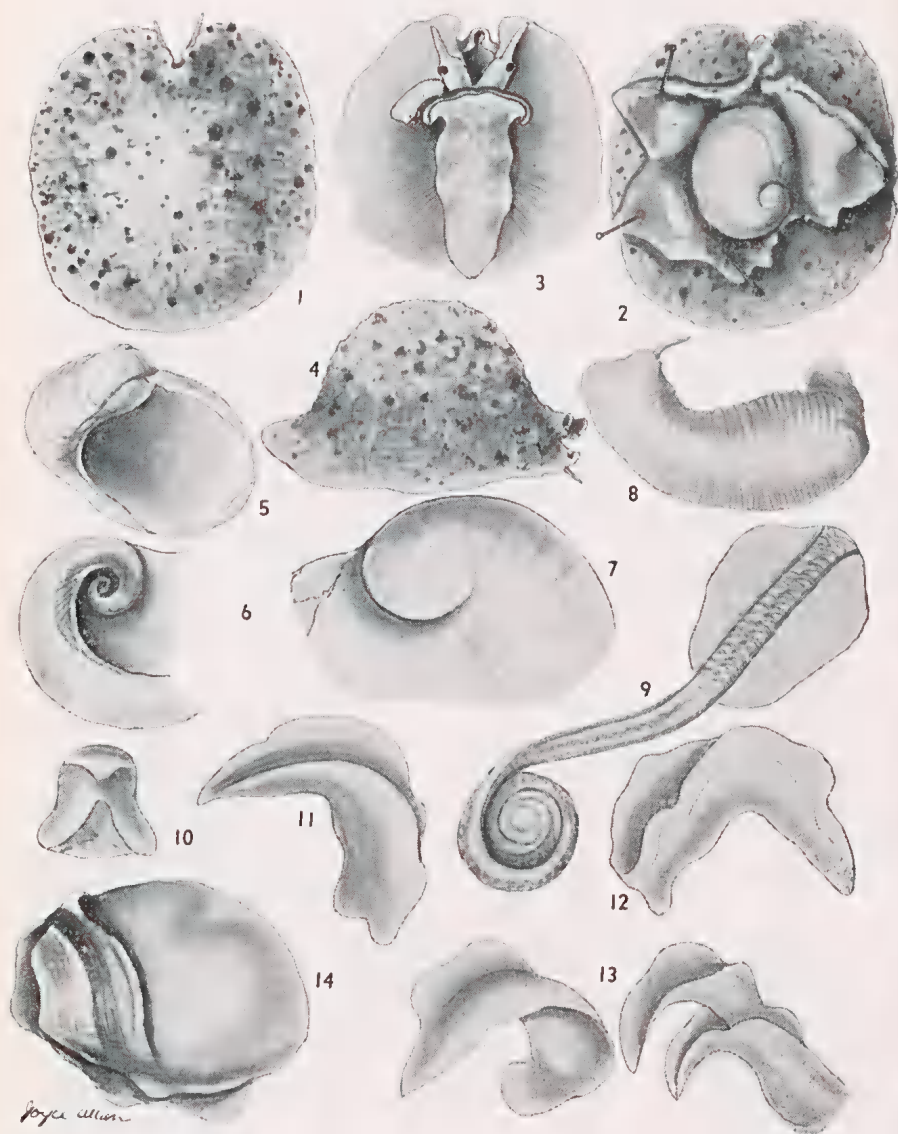
- Fig. 1. Dorsal view of animal *Lamellaria* sp. B., from Long Reef, N.S.W.
- Fig. 2. Mantle cut to expose internal shell in situ.
- Fig. 3. Undersurface of species showing eye-bearing tentacles, penis on left side between mantle and head, and complete foot with anterior groove terminating in side wings.
- Fig. 4. Side view showing normal elevation of animal.
- Figs. 5, 6, 7. Views of complete shell, and internal and external view of spire (all magnified).
- Fig. 8. Penis of *Lamellaria* sp. B. (magnified).
- Fig. 9. Complete radula (magnified).
- Fig. 10. Median tooth from radula.
- Figs. 11, 12, 13. Lateral teeth from radula.
- Fig. 14. Jaw removed from animal, *Lamellaria* sp. B.

Plate 12.

- Fig. 1. Side view of *Lamellaria* sp. C., from Angourie, Clarence River, N.S.W.
- Fig. 2. Dorsal mantle of same cut to expose shell in situ.
- Fig. 3. Head showing eye-bearing tentacles.
- Fig. 4. Undersurface of anterior end of mantle showing dark depression which apparently serves as siphonal groove.
- Fig. 5. Undersurface of mantle to show branchial cavity in relation to head and upper end of foot.
- Figs. 6, 7. Two views of complete shell.
- Fig. 8. Jaw of *Lamellaria* sp. C.
- Fig. 9. Median tooth from radula.
- Fig. 10. Selection of lateral teeth from various rows of radula.
- Fig. 11. *Lamellaria* sp. D., from Angourie and Woody Head, Clarence River, N.S.W. (male).
- Fig. 12. Anterior view beneath mantle showing head with tentacles, and below the head the front view of foot showing the lateral groove.
- Fig. 13. Penis of male.
- Figs. 14, 15. Shell of male animal.
- Figs. 16, 17. Shell of female (shells and sectional drawings all magnified).
- Fig. 18. Jaw.
- Fig. 19. Median tooth from radula of female.
- Fig. 20. Some laterals from same.



Plate 10.



Joyce Allen

(Plate II)

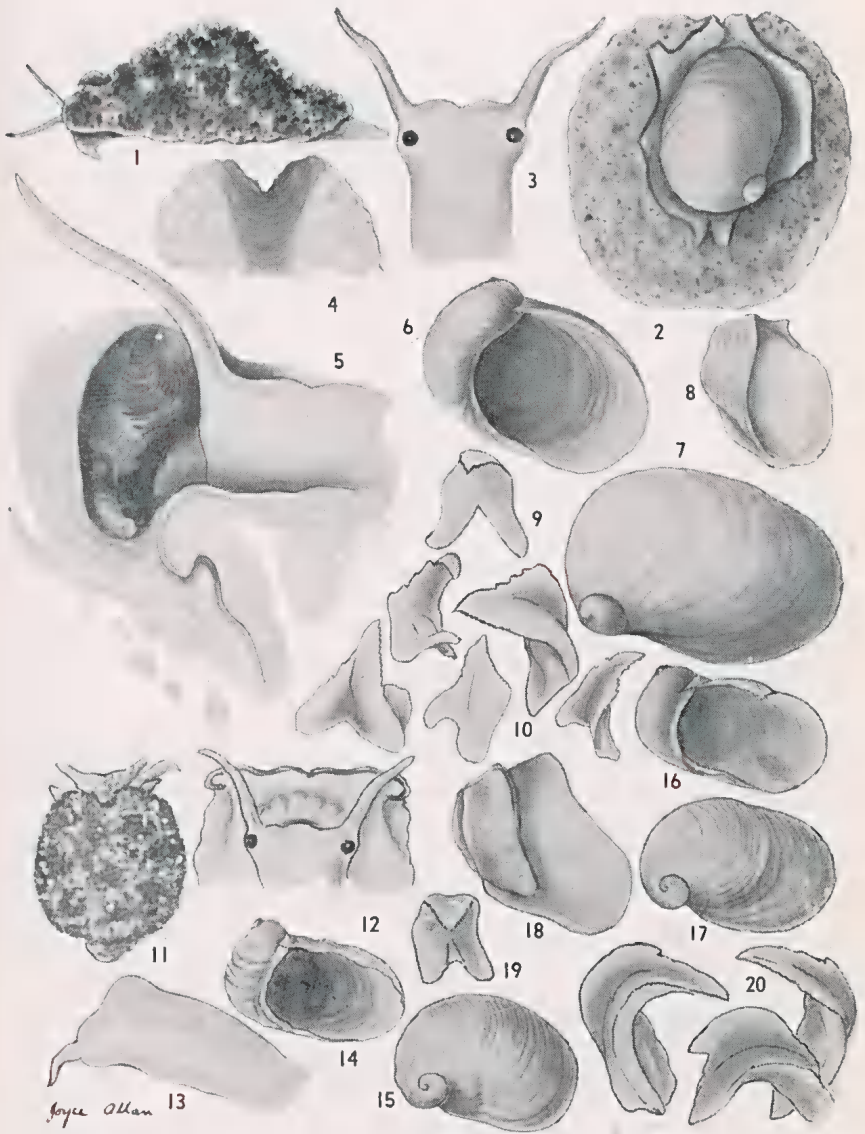


Plate 12.